# CLAIMS

What is claimed is:

1. A method of designing a direct expansion geothermal heat exchange system comprising:

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 100 feet per ton of maximum system tonnage design when the heat exchange vapor line is within 95%, or greater, rock, where rock excludes pumice, obsidian, and all other porous rock that is not permanently water saturated;

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 110 feet per ton of maximum system tonnage design when the heat exchange vapor line is within 80%, or greater, rock, or is within permanently water saturated sand, where rock excludes pumice, obsidian, and all other porous rock that is not permanently water saturated;

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 125 feet per ton of maximum system tonnage design when the heat exchange vapor line is within soil; excluding soil containing 20%, or more, of clay and/or sand that is not permanently moist; and

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 175 feet per ton of maximum

system tonnage design when the heat exchange vapor line is within soil containing 20%, or more, of clay and/or sand that is not permanently moist.

2. A method of designing a direct expansion geothermal heat exchange system comprising providing refrigerant grade tubing/lines specifically sized to connect the interior equipment, such as the compressor unit and the air handler, with the exterior sub-surface geothermal heat exchange lines, at any depth, with the connecting refrigerant grade tubing/lines sized to match the system's compressor' maximum tonnage design capacity as follows:

for a 12,000 BTU through 30,000 BTU compressor size, use a 3/8 inch liquid line and a 3/4 inch vapor line;

for a 36,000 BTU through 48,000 BTU compressor size, use a 1/2 inch liquid line and a 7/8 inch vapor line; and

for a 54,000 BTU through 60,000 BTU compressor size, use a 1/2 inch liquid line and a 1 inch vapor line.

3. The method of claim 2, further comprising providing a fully insulated sub-surface liquid refrigerant transport line whenever the sub-surface liquid refrigerant transport line is within at least a 10 foot distance of the un-insulated vapor refrigerant transport line.

4. A method of designing a direct expansion geothermal heat exchange system comprising providing at least one un-insulated heat exchange vapor refrigerant transport line within one of a trench and a pit for purposes of

geothermal heat transfer, where such vapor line is operatively connected to the direct expansion system's interior equipment at one end (as is well understood by those skilled in the art) and is operatively connected to at least one un-insulated liquid refrigerant transport line at the other end.

5. The method of claim 4, further comprising providing such vapor line that is operatively connected to at least one insulated liquid refrigerant transport line at the other end.

6. The method of claim 4, further comprising providing insulation to completely surround the portions of the exterior liquid line(s), and the portions of the exterior vapor line(s), within a distance of three feet below the maximum frost line in the particular geographic area, and within a close enough proximity of one of a water line, a sewer line, and ground water adjacent to a structural wall to freeze any such water/liquid.

7. The method of claim 4, further comprising providing, in a LTDX application, an exterior heat transfer vapor line that is one of horizontally positioned and generally sloped downwardly to the coupling with the liquid line at the lowest point of the vapor line.

8. A method of designing a direct expansion geothermal heat exchange system comprising providing, in a LTDX application, covering the exterior heat transfer vapor line(s) with a good heat conductive material comprised of one of a

heat conductive grout, grout 111, a concrete mixture, a cement mixture, silica sand, powdered stone, finely chipped stone with no larger than 1/4 inch chips.

9. The method of claim 8, further comprising providing a perforated soaker hose that is placed on top of the heat conductive material covering the exterior heat transfer vapor line(s).

10. The method of claim 8, further comprising providing channeling the direct expansion system's condensate drain line into the top of the soaker hose.

11. A method of designing a direct expansion geothermal heat exchange system comprising providing sizing for multiple distributed LTDX system exterior, sub-surface, liquid refrigerant transport lines/tubes, and for sizing multiple distributed LTDX system exterior, sub-surface, vapor refrigerant transport lines/tubes, based upon maximum system compressor tonnage (where 1 ton equals 12,000 BTUs) design size capacity, as follows:

for a 12,000 BTU through a 30,000 BTU compressor size, use one 3/8 inch Liquid Line and one 3/4 inch Vapor Line in one trench for all standard designs up to 125 feet per ton, with the one exception of when any one trench exceeds 300 feet in length, and in such event, two equally sized trenches must be used, with each respective trench utilizing one 3/8 inch Liquid Line and one 3/4 inch Vapor Line; and

for a 36,000 BTU through 60,000 BTU compressor size, use two trenches, with each respective, and equally sized, trench containing a respective 3/8 inch

Liquid Line and a respective 3/4 inch Vapor Line, with the one exception of when any two trenches, respectively exceed 300 feet in length each, and in such event, three equally sized trenches must be utilized as necessary, with each respective trench utilizing one 3/8 inch Liquid Line and one 3/4 inch Vapor Line.

12. A method of designing a direct expansion geothermal heat exchange system comprising providing keeping all un-insulated, subsurface, refrigerant transport geothermal heat transfer tubing, in a LTDX design, at a minimum distance of 10 feet away from any other un-insulated subsurface refrigerant transport geothermal heat transfer tubing, except at sub-surface refrigerant tubing distributor locations.

13 A method of designing a direct expansion geothermal heat exchange system comprising providing a refrigerant with system operational working pressures at least 33% greater than the system operational working pressures of R-22.

14. The method of claim 13, further comprising providing system components designed to withstand comparably greater system operational working pressures, which will be at least 33% greater than the system operational working pressures of R-22.

15. The method of claim 13, further comprising providing an R-410A refrigerant.

16. The method of claim 15, further comprising providing a polyol ester lubricating oil for the system's compressor.

17. The method of claim 15, further comprising providing a filter dryer that has been oversized by a factor of at least 10% above the size of filter dryer used in an R-22 based system.

18. A method of designing a geothermal heat exchange system within a borehole/well comprising providing insulation to surround only the top 75%, plus or minus 5% of 100%, portion of the liquid refrigerant transport tube/line within the subsurface well/borehole.

19. The method of claim 18, further comprising providing placing insulation between the lower 25%, plus or minus 5% of 100%, portion of the liquid refrigerant transport tube/line and the vapor refrigerant transport tube/line within the subsurface well/borehole.

20. A method of designing a geothermal heat exchange system within a borehole/well comprising providing a watertight containment pipe comprised of one of steel, galvanized steel, polyethylene, and copper, for purposes of containing the sub-surface liquid refrigerant transport line and vapor refrigerant transport line(s) within a well/borehole.

21. A method of designing a geothermal heat exchange system within a borehole/well comprising providing multiple wells/boreholes that are distanced from one another by at least 15 feet.

22. A method of designing a geothermal heat exchange system within a borehole/well comprising providing that the top of any containment pipe utilized in a DWDX application is completely sealed at the top in a watertight manner after insertion of the refrigerant transport tubing, and after the pipe is filled with one of a fluid and a gel to the design level.

23. A method of designing a direct expansion geothermal heat exchange system comprising providing that when a containment pipe composed of polyethylene is utilized in one of a DWDX system application and a LTDX application, the design length of the containment pipe, and the refrigerant transport tubing contained within, must be increased by at least five percent (5%).

24. A method of designing a direct expansion geothermal heat exchange system comprising providing that in a well/borehole system application where a containment pipe is utilized, at least 20% of one of a liquid and a gel within the containment pipe is propylene glycol antifreeze.

25. A method of designing a direct expansion geothermal heat exchange system comprising providing that when the system is operating in the heating mode, the system is programmed to operate in the cooling mode at least one time for a 10 minute period once every 10 days.

26. A method of designing a direct expansion geothermal heat exchange system comprising providing where operation in the heating mode is required 70%, or more, of the time, the interior heat exchanger tonnage capacity is designed at

110%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity.

27. A method of designing a direct expansion geothermal heat exchange system comprising providing where operation in the cooling mode is required 70%, or more, of the time, the interior heat exchanger tonnage capacity is designed at 170%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity

28. A method of designing a direct expansion geothermal heat exchange system comprising providing pin restrictors (Aeroquip type) which are sized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, by means of the following table based upon the number of line sets and the maximum compressor tonnage design, while operating in the heating mode, where a single line set is comprised of one liquid line and one sub-surface geothermal heat exchange vapor line; where a double line set is comprised of two liquid lines and two sub-surface geothermal heat exchange vapor lines of approximate equal length and/or depth; where a triple line set is comprised of three liquid lines and three sub-surface geothermal heat exchange vapor lines of approximate equal length and/or depth, and where a pin restrictor of the prescribed size is placed within the liquid line of each respective line set:

Maximum Compressor Tonnage Design - Pin Restrictor Bore Hole Diameter

Size In Inches

***For A Single Line Set Direct Expansion System**

1.5 ....................................................0.041

2.......................................................0.049

2.5....................................................0.055

3.......................................................0.059

3.5....................................................0.063

4.......................................................0.065

4.5....................................................0.069

5.......................................................0.071

***For A Double Line Set Direct Expansion System**

1.5 ....................................................0.029

2.......................................................0.035

2.5....................................................0.039

3.......................................................0.042

3.5.......................................................0.045

4..........................................................0.046

4.5.......................................................0.049

5..........................................................0.050

***For A Triple Line Set Direct Expansion System**

1.5 .......................................................0.024

2..........................................................0.028

2.5.......................................................0.032

3..........................................................0.034

3.5.......................................................0.036

4..........................................................0.038

4.5.......................................................0.040

5..........................................................0.041

29. The method of claim 28, further comprising providing that when the said design

criteria calls for two or three boreholes or trenches in conjunction with one compressor unit,

respective pin restrictor housing and pin restrictors must be installed within each respective line

set, at respective and approximately equally distanced points, between the liquid line distributor

and the respective liquid line's coupling to the respective sub-surface geothermal heat exchange

vapor line.

30. A method of designing a direct expansion geothermal heat exchange system comprising providing the following single piston metering device pin restrictor (Aeroquip type) sizes (based on central bore hole size in inches) to be utilized in the cooling mode, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central bore hole size, at any height, by means of the following table, based upon one line set and the maximum compressor tonnage design, with

the R410A refrigerant charge adjusted at each respective height so as to provide optimum system operational efficiencies:

Maximum Compressor Tonnage Design - Pin Restrictor Bore Hole Diameter Size In Inches

*(At any height of interior heat exchange means above the compressor unit)

1.5 ........................................................0.058

2............................................................0.070

2.5.........................................................0.077

3............................................................0.085

3.5.........................................................0.093

4............................................................0.099

4.5.........................................................0.100

5............................................................0.112.

31. A method of designing a direct expansion geothermal heat exchange system comprising providing a conventional dual directional receiver sized to hold at least 40% of the maximum direct expansion system's operational R-410A refrigerant charge.

32. A method of designing a direct expansion geothermal heat exchange system comprising placing the sub-surface insulated liquid refrigerant transport tube and the sub-surface un-insulated vapor refrigerant tube within its own

individual watertight containment pipe, with the two respective containment pipes joined in a U bend fashion at the distal end of the refrigerant transport tubing loop.

33. The method of claim 32, further comprising providing respective watertight containment pipes comprised of polyethylene.

34. A direct expansion geothermal heat exchange system comprising:

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 100 feet per ton of maximum system tonnage design when the heat exchange vapor line is within 95%, or greater, rock, where rock excludes pumice, obsidian, and all other porous rock that is not permanently water saturated;

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 110 feet per ton of maximum system tonnage design when the heat exchange vapor line is within 80%, or greater, rock, or is within permanently water saturated sand, where rock excludes pumice, obsidian, and all other porous rock that is not permanently water saturated;

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 125 feet per ton of maximum system tonnage design when the heat exchange vapor line is within soil; excluding soil containing 20%, or more, of clay and/or sand that is not permanently moist; and

providing exterior, sub-surface, geothermal vapor refrigerant transport tubing design lengths, at any depth, at a minimum of 175 feet per ton of maximum

system tonnage design when the heat exchange vapor line is within soil containing 20%, or more, of clay and/or sand that is not permanently moist.

35. A direct expansion geothermal heat exchange system comprising providing refrigerant grade tubing/lines specifically sized to connect the interior equipment, such as the compressor unit and the air handler, with the exterior sub-surface geothermal heat exchange lines, at any depth, with the connecting refrigerant grade tubing/lines sized to match the system's compressor' maximum tonnage design capacity as follows:

for a 12,000 BTU through 30,000 BTU compressor size, use a 3/8 inch liquid line and a 3/4 inch vapor line;

for a 36,000 BTU through 48,000 BTU compressor size, use a 1/2 inch liquid line and a 7/8 inch vapor line; and

for a 54,000 BTU through 60,000 BTU compressor size, use a 1/2 inch liquid line and a 1 inch vapor line.

36. The system of claim 35, further comprising providing a fully insulated sub-surface liquid refrigerant transport line whenever the sub-surface liquid refrigerant transport line is within at least a 10 foot distance of the un-insulated vapor refrigerant transport line.

37. A direct expansion geothermal heat exchange system comprising providing at least one un-insulated heat exchange vapor refrigerant transport line within one of a trench and a pit for purposes of geothermal heat transfer, where

such vapor line is operatively connected to the direct expansion system's interior equipment at one end (as is well understood by those skilled in the art) and is operatively connected to at least one un-insulated liquid refrigerant transport line at the other end.

38. The system of claim 37, further comprising providing such vapor line that is operatively connected to at least one insulated liquid refrigerant transport line at the other end.

39. The system of claim 37, further comprising providing insulation to completely surround the portions of the exterior liquid line(s), and the portions of the exterior vapor line(s), within a distance of three feet below the maximum frost line in the particular geographic area, and within a close enough proximity of one of a water line, a sewer line, and ground water adjacent to a structural wall to freeze any such water/liquid.

40. The system of claim 37, further comprising providing, in a LTDX application, an exterior heat transfer vapor line that is one of horizontally positioned and generally sloped downwardly to the coupling with the liquid line at the lowest point of the vapor line.

41. A direct expansion geothermal heat exchange system comprising providing, in a LTDX application, covering the exterior heat transfer vapor line(s) with a good heat conductive material comprised of one of a heat conductive grout,

grout 111, a concrete mixture, a cement mixture, silica sand, powdered stone, finely chipped stone with no larger than 1/4 inch chips.

42. The system of claim 41, further comprising providing a perforated soaker hose that is placed on top of the heat conductive material covering the exterior heat transfer vapor line(s).

43. The system of claim 41, further comprising providing channeling the direct expansion system's condensate drain line into the top of the soaker hose.

44. A direct expansion geothermal heat exchange system comprising providing sizing for multiple distributed LTDX system exterior, sub-surface, liquid refrigerant transport lines/tubes, and for sizing multiple distributed LTDX system exterior, sub-surface, vapor refrigerant transport lines/tubes, based upon maximum system compressor tonnage (where 1 ton equals 12,000 BTUs) design size capacity, as follows:

for a 12,000 BTU through a 30,000 BTU compressor size, use one 3/8 inch Liquid Line and one 3/4 inch Vapor Line in one trench for all standard designs up to 125 feet per ton, with the one exception of when any one trench exceeds 300 feet in length, and in such event, two equally sized trenches must be used, with each respective trench utilizing one 3/8 inch Liquid Line and one 3/4 inch Vapor Line; and

for a 36,000 BTU through 60,000 BTU compressor size, use two trenches, with each respective, and equally sized, trench containing a respective 3/8 inch

Liquid Line and a respective 3/4 inch Vapor Line, with the one exception of when any two trenches, respectively exceed 300 feet in length each, and in such event, three equally sized trenches must be utilized as necessary, with each respective trench utilizing one 3/8 inch Liquid Line and one 3/4 inch Vapor Line.

45. A direct expansion geothermal heat exchange system comprising providing keeping all un-insulated, subsurface, refrigerant transport geothermal heat transfer tubing, in a LTDX design, at a minimum distance of 10 feet away from any other un-insulated subsurface refrigerant transport geothermal heat transfer tubing, except at sub-surface refrigerant tubing distributor locations

46 A direct expansion geothermal heat exchange system comprising providing a refrigerant with system operational working pressures at least 33% greater than the system operational working pressures of R-22.

47. The system of claim 46, further comprising providing system components designed to withstand comparably greater system operational working pressures, which will be at least 33% greater than the system operational working pressures of R-22.

48. The system of claim 46, further comprising providing an R-410A refrigerant.

49. The system of claim 48, further comprising providing a polyol ester lubricating oil for the system's compressor.

50. The system of claim 48, further comprising providing a filter dryer that has been oversized by a factor of at least 10% above the size of filter dryer used in an R-22 based system.

51. A geothermal heat exchange system within a borehole/well comprising providing insulation to surround only the top 75%, plus or minus 5% of 100%, portion of the liquid refrigerant transport tube/line within the subsurface well/borehole.

52. The system of claim 51, further comprising providing placing insulation between the lower 25%, plus or minus 5% of 100%, portion of the liquid refrigerant transport tube/line and the vapor refrigerant transport tube/line within the subsurface well/borehole.

53. A geothermal heat exchange system within a borehole/well comprising providing a watertight containment pipe comprised of one of steel, galvanized steel, polyethylene, and copper, for purposes of containing the sub-surface liquid refrigerant transport line and vapor refrigerant transport line(s) within a well/borehole.

54. A geothermal heat exchange system within a borehole/well comprising providing multiple wells/boreholes that are distanced from one another by at least 15 feet.

55. A geothermal heat exchange system within a borehole/well comprising providing that the top of any containment pipe utilized in a DWDX application is

completely sealed at the top in a watertight manner after insertion of the refrigerant transport tubing, and after the pipe is filled with one of a fluid and a gel to the design level.

56. A direct expansion geothermal heat exchange system comprising providing that when a containment pipe composed of polyethylene is utilized in one of a DWDX system application and a LTDX application, the design length of the containment pipe, and the refrigerant transport tubing contained within, must be increased by at least five percent (5%).

57. A direct expansion geothermal heat exchange system comprising providing that in a well/borehole system application where a containment pipe is utilized, at least 20% of one of a liquid and a gel within the containment pipe is propylene glycol antifreeze.

58. A direct expansion geothermal heat exchange system comprising providing that when the system is operating in the heating mode, the system is programmed to operate in the cooling mode at least one time for a 10 minute period once every 10 days.

59. A direct expansion geothermal heat exchange system comprising providing where operation in the heating mode is required 70%, or more, of the time, the interior heat exchanger tonnage capacity is designed at 110%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity.

60. A direct expansion geothermal heat exchange system comprising providing where operation in the cooling mode is required 70%, or more, of the time, the interior heat exchanger tonnage capacity is designed at 170%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity

61. A direct expansion geothermal heat exchange system comprising providing pin restrictors (Aeroquip type) which are sized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, by means of the following table based upon the number of line sets and the maximum compressor tonnage design, while operating in the heating mode, where a single line set is comprised of one liquid line and one sub-surface geothermal heat exchange vapor line; where a double line set is comprised of two liquid lines and two sub-surface geothermal heat exchange vapor lines of approximate equal length and/or depth; where a triple line set is comprised of three liquid lines and three sub-surface geothermal heat exchange vapor lines of approximate equal length and/or depth, and where a pin restrictor of the prescribed size is placed within the liquid line of each respective line set:

Maximum Compressor Tonnage Design - Pin Restrictor Bore Hole Diameter Size In Inches

***For A Single Line Set Direct Expansion System**

| | |
|---|---|
| 1.5 | 0.041 |
| 2 | 0.049 |
| 2.5 | 0.055 |
| 3 | 0.059 |
| 3.5 | 0.063 |
| 4 | 0.065 |
| 4.5 | 0.069 |
| 5 | 0.071 |

***For A Double Line Set Direct Expansion System**

| | |
|---|---|
| 1.5 | 0.029 |
| 2 | 0.035 |
| 2.5 | 0.039 |
| 3 | 0.042 |
| 3.5 | 0.045 |
| 4 | 0.046 |
| 4.5 | 0.049 |
| 5 | 0.050 |

***For A Triple Line Set Direct Expansion System**

| | |
|---|---|
| 1.5 | 0.024 |
| 2 | 0.028 |
| 2.5 | 0.032 |
| 3 | 0.034 |
| 3.5 | 0.036 |
| 4 | 0.038 |
| 4.5 | 0.040 |
| 5 | 0.041 |

62. The system of claim 61, further comprising providing that when the said design

criteria calls for two or three boreholes or trenches in conjunction with one compressor unit,

respective pin restrictor housing and pin restrictors must be installed within each respective line

set, at respective and approximately equally distanced points, between the liquid line distributor

and the respective liquid line's coupling to the respective sub-surface geothermal heat exchange

vapor line.

63. A direct expansion geothermal heat exchange system comprising providing the following single piston metering device pin restrictor (Aeroquip type) sizes (based on central bore hole size in inches) to be utilized in the cooling mode, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central bore

hole size, at any height, by means of the following table, based upon one line set and the maximum compressor tonnage design, with the R410A refrigerant charge adjusted at each respective height so as to provide optimum system operational efficiencies:

Maximum Compressor Tonnage Design - Pin Restrictor Bore Hole Diameter Size In Inches

***(At any height of interior heat exchange means above the compressor unit)**

1.5 ....................................................0.058
2.......................................................0.070
2.5.....................................................0.077
3.......................................................0.085
3.5.....................................................0.093
4.......................................................0.099
4.5.....................................................0.100
5.......................................................0.112.

64. A direct expansion geothermal heat exchange system comprising providing a conventional dual directional receiver sized to hold at least 40% of the maximum direct expansion system's operational R-410A refrigerant charge.

65. A direct expansion geothermal heat exchange system comprising placing the sub-surface insulated liquid refrigerant transport tube and the sub-surface un-insulated vapor refrigerant tube within its own individual watertight containment pipe, with the two respective containment pipes joined in a U bend fashion at the distal end of the refrigerant transport tubing loop.

66. The system of claim 65, further comprising providing respective watertight containment pipes comprised of polyethylene.

67. A method of designing a direct expansion geothermal heat exchange system comprising providing an insulated copper liquid refrigerant transport line and an un-insulated copper vapor refrigerant transport line in a trench, with the terminal distal end/loop of the sub-surface heat exchange copper liquid and vapor refrigerant transport lines being placed within one of a well/borehole and an excavated area which extends to a depth in excess of that of the trench near the end of the subsurface geothermal refrigerant flow heat exchange path in the cooling mode of system operation.

68. The method of claim 67 where the vapor refrigerant line/tube within the trench must be one of substantially horizontal and downwardly slopping along the refrigerant flow path in the cooling mode of operation.

69. A method of designing a direct expansion geothermal heat exchange system comprising providing of an un-insulated vapor refrigerant transport line in a looped trench, which vapor line would connect to a liquid refrigerant transport line at the deepest point of the sub-surface heat transfer area while operating in the cooling mode.

70. A direct expansion geothermal heat exchange system comprising providing an insulated copper liquid refrigerant transport line and an un-insulated copper vapor refrigerant transport line in a trench, with the terminal distal end/loop

of the sub-surface heat exchange copper liquid and vapor refrigerant transport lines being placed within one of a well/borehole and an excavated area which extends to a depth in excess of that of the trench near the end of the subsurface geothermal refrigerant flow heat exchange path in the cooling mode of system operation.

71. The system of claim 70 where the vapor refrigerant line/tube within the trench must be one of substantially horizontal and downwardly slopping along the refrigerant flow path in the cooling mode of operation.

72. A direct expansion geothermal heat exchange system comprising providing of an un-insulated vapor refrigerant transport line in a looped trench, which vapor line would connect to a liquid refrigerant transport line at the deepest point of the sub-surface heat transfer area while operating in the cooling mode.

73. A method of creating a trench for a geothermal heat exchange system comprising providing a heavy plate with a lower bladed portion that is one of straight, angled, curved, and rounded, with such plate being forced into the ground by means of one of weight, pressure, hydraulic force, plowing and hammering.

74. The method of claim 73 where the heavy plate is comprised of a wheel, with extreme weight or pressure being placed upon its central axel.

75. A system of creating a trench for a geothermal heat exchange system comprising providing a heavy plate with a lower bladed portion that is one of straight, angled, curved, and rounded, with such plate being forced into the ground by means of one of weight, pressure, hydraulic force, plowing and hammering.

76. The system of claim 75 where the heavy plate is comprised of a wheel, with extreme weight or pressure being placed upon its central axel.